



San Jacinto River Authority

ADMINISTRATIVE OFFICE
P.O. Box 329 • Conroe, Texas 77305
(T) 936.588.3111 • (F) 936.588.3043

June 12, 2020

Texas Water Development Board
ATTN: FIF Abridged Application
P.O. Box 13231
Austin, Texas 78711

Re: FIF Abridged Application: San Jacinto River Sand Trap Development Preliminary Design

Dear Mr. Entsminger:

The San Jacinto River Authority thanks the Texas Water Development Board (TWDB) for the opportunity to submit an abridged application for funding via the recently created Flood Infrastructure Fund. Attached please find the abridged application for San Jacinto River Sand Trap Development Preliminary Design with the following attachments:

1. Attachment A: Project Benefit Area
2. Attachment B: Census/ SVI Data and Calculations
3. Attachment C: Grant Percentage Calculator Spreadsheet
4. Attachment D: Disaster Declarations for Hurricane Harvey and Tropical Storm Imelda
5. Attachment E: NFIP Certifications from Liberty County, San Jacinto County, Harris County, Montgomery County, City of Houston, and City of Conroe
6. Attachment F: San Jacinto Regional Watershed Master Drainage Plan Project Fact Sheet
7. Attachment G: Conceptual Design Scope

We appreciate your review and consideration of this application, and look forward to working with TWDB as a regional partner on efforts to reduce flood risks within the San Jacinto River Basin.

If you have any questions or require further documentation or data, please contact me at (936)-588-7177 or mbarrett@sjra.net.

Sincerely,

Matt Barrett, P.E.
Division Engineer

LAKE CONROE DIVISION
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GRP DIVISION
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WOODLANDS DIVISION
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HIGHLANDS DIVISION
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FLOOD MANAGEMENT DIVISION
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(F) 936.588.1114

SFY 2020 Flood Project Abridged Application

Due June 15, 2020 at 5:00 p.m.
Email to FIF@twdb.texas.gov

By submitting this Abridged Application, you understand and confirm that the information provided is true and correct to the best of your knowledge and further understand that the failure to submit a complete Abridged Application by the stated deadlines, or to respond in a timely manner to additional requests for information, may result in the withdrawal of the Abridged Application without review.

GENERAL INFORMATION

Entity Name		
San Jacinto River Authority		
Entity Type		
River Authority		
Contact Who should TWDB contact with questions during the review of this submission?	Name	Matt Barrett, PE
	Title	Division Engineer
	Phone	936-588-7177
	Email	mbarrett@sjra.net

PROJECT INFORMATION

Project Name	San Jacinto River Sand Trap Development Preliminary Design		
Amount Requested from TWDB	\$200,000 (50% grant based on attached calculations (Attachment C))		
Financing from Federal Sources	\$0		
(if receiving federal funds, include the federal agency and program)	N/A		
Financing from Other Sources	\$200,000 (local match for remaining 50% not covered by grant)		
Total Project Cost (Check here if requesting loan funds only <input type="checkbox"/>)	\$400,000		
Category Applied For			
<input checked="" type="checkbox"/> <u>Category 1</u> Flood Protection Planning for Watersheds See item (G) in Description of Proposed Project for explanation.	<input type="checkbox"/> <u>Category 2</u> Planning, Acquisition, and Design, Construction / Rehabilitation (All combinations)	<input type="checkbox"/> <u>Category 3</u> Federal Award Matching Funds	<input type="checkbox"/> <u>Category 4</u> Measures immediately effective in protecting life and property

MINIMUM STANDARDS

Only projects that satisfy all minimum standards will be included in the prioritization.	<input checked="" type="checkbox"/>	1. For applicable projects, the benefit-cost ratio of the proposed project is >1.0 or an explanation is provided. See item (H) in project description for explanation.
	<input type="checkbox"/>	2. For applicable projects, a proposed MOU and a project description was provided to all eligible political subdivisions and the list of political subdivisions that received this information is attached to the abridged application. N/A for Category 1 projects per Intended Use Plan.
	<input checked="" type="checkbox"/>	3. The applicant has acted cooperatively with other political subdivisions to address flood control needs in the area in which the eligible political subdivisions are located; and all eligible political subdivisions substantially affected by the proposed flood project have participated in the process of developing the proposed flood project. Requested input from multiple entities during the development of this project. See item (F) in Description of Proposed Project for explanation.
	<input checked="" type="checkbox"/>	4. The funding request does not include redundant funding for activities already performed and/or funded through another source.
	<input checked="" type="checkbox"/>	5. a. The area to be served by the proposed project has floodplain ordinances in place and is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards. See Attachment E. OR
	<input type="checkbox"/>	5. b. Requesting funds to fulfill additional requirements for participation in the National Flood Insurance Program. N/A
	<input checked="" type="checkbox"/>	6. The proposed project was developed using the best and most recent available data. See item (A) in Description of Proposed Project for explanation.
	<input checked="" type="checkbox"/>	7. a. (Construction applicants only) Operations and maintenance costs associated with proposed facilities have been considered. N/A, but see item (I) in Description of Proposed Project.
	<input checked="" type="checkbox"/>	7. b. (Construction applicants only) Floodwater capture techniques have been considered. N/A, but see item (D) in Description of Proposed Project.

DESCRIPTION OF PROPOSED PROJECT

House Bill 1824, approved by the 86th Texas Legislature, allows SJRA and the Harris County Flood Control District (HCFCD) to remove material from the San Jacinto River and its tributaries to restore, maintain, or expand storm flow capacity without the need for state permitting or a royalty payment to the state. SJRA is leading efforts, with support from HCFCD, to perform a project to plan, design, and construct one or more "sand traps" along the West and/or East Forks of the San Jacinto River to reduce future sedimentation with the goal of mitigating flooding. A major component of the project is coordinating with Aggregate Production Operations (APOs) along the West and East Forks of the San Jacinto River in an attempt to establish a public/private partnership which would provide for the performance of operation and maintenance of the proposed sand trap(s) by an APO or APOs in the vicinity of the sand trap(s). The first phase of the overall project, a conceptual design effort, is currently underway. Conceptual design efforts include, but are not necessarily limited to, identifying and evaluating potential sand trap locations and trapping efficacy, developing conceptual sand trap solutions, determining downstream benefits of potential sand trap solutions, and developing a conceptual design report which will include recommendations for which site(s) to carry forward into the preliminary engineering phase. Upon completion of the conceptual design phase, the goal is to move forward with preliminary design on two sites selected from the conceptual design, with the ultimate goal being design and construction of likely one, but potentially two, sand traps. See Attachment G for the scope of work for the conceptual design effort.

This small scale effort, involving only one or two sand traps, is intended to act as a "pilot" project from which data can be gathered as to the real-world feasibility and effectiveness of sand traps in removing material from the river(s) and mitigating sedimentation issues in the basin before a larger, and much more costly, program is potentially embarked upon. In order to continue the project beyond the conceptual design phase, and especially through construction, even on this relatively small pilot scale, additional funding is anticipated to be required to supplement available local match resources.

The purpose of the project/phase for which this application is being submitted is to perform preliminary engineering design efforts for two potential sand trap solutions, based on and continuing efforts performed in the conceptual design phase. These efforts could include, but are not limited to, environmental permitting investigation, preliminary land acquisition efforts, survey, geotechnical investigation, and 30% design efforts. Preliminary conceptual design phase results indicate that the sand traps recommended to move forward to preliminary design will likely be located along the West Fork of the San Jacinto River.

- A) The project will be performed utilizing the most recent/best available data, technology, and techniques available to SJRA. In addition to continuing efforts performed in first phase of the overall sand trap development effort (conceptual design), the proposed project will take advantage of any relevant data, models, etc. developed as part of the in progress and nearing completion San Jacinto Regional Watershed Master Drainage Plan project (SJRWMDP) being performed by HCFCD, which is utilizing Atlas 14 rainfall. The SJRWMDP is a \$2.7 million comprehensive regional study funded 25% by local partners HCFCD, SJRA, Montgomery County, and the City of Houston, and 75% by FEMA, conveyed through the Texas Division of Emergency Management. See Attachment F for more information on the SJRWMDP. The project will also utilize any relevant data from and build upon efforts by the U.S. Army Corps of Engineers (USACE) and Harris County to dredge accumulated sediment from the mouth of Lake Houston. To date, over 2.3 million cubic yards of material have been removed by USACE, at a cost of over \$90 million, partially funded by FEMA. An additional \$30 million has been dedicated to Harris County from the Texas Water Development Board to further dredging efforts via Senate Bill 500 from the 86th Texas Legislative Session. By utilizing data from and building upon the SJRWMDP and Lake Houston dredging efforts, the proposed project will increase the benefits gained from the large state and federal investments made for these projects. Finally, SJRA is submitting a separate FIF abridged application for an Upper San Jacinto River Basin Regional Sedimentation Study. If that project is funded and moves forward, any relevant data from that effort can be shared with and utilized for this project, and vice versa.
- B) For the purposes of SVI and AMHI and other census bureau data calculations, the immediate benefit area for the effort included in this application was considered as any census block group "more than minimally" overlapping (i.e. approximately more than 10% overlapping) the 100-year (1% annual chance) storm event inundation extent along the West Fork of the San Jacinto River between Lake Conroe and Lake Houston, and around Lake Houston, acquired from the draft model developed for the SJRWMDP (see item (A) above). This is based on the fact that the ultimate goal of the overall project (all phases) is to construct one or two sand traps along likely the West Fork of the San Jacinto River, based on preliminary conceptual design phase findings. See Attachment A for project benefit area map. If a sand trap were to be recommended from the conceptual design efforts for construction on the East Fork of the San Jacinto River, the project benefit area could change, however that is not anticipated. Long-term benefits beyond the initial sand trap development "pilot" project are anticipated to potentially extend beyond the immediate benefit area (see item (G) below).
- C) It is anticipated that this study can be completed within 18 months, as indicated in the Prioritization Criteria section below. Completion of the entire project, however, including future final design and construction phases, will take longer than 18 months to complete. It is anticipated that these future phases could be completed within 36 months, with adequate and timely funding made available.
- D) Any sedimentation reduction activity in the Upper San Jacinto River Basin (Lake Houston watershed), including construction of sand traps, is anticipated to achieve some level of reduction of sediment load entering Lake Houston, which would in turn reduce storage reduction in the lake, which is the major water supply reservoir for the City of Houston and surrounding communities.
- E) The level of flood mitigation potentially provided by constructing the proposed sand trap(s) is not quantified at this time. However, the goal of constructing the sand trap(s) is to restore, maintain, or expand storm flow capacity, which could potentially remove structures from the floodplain. Flood mitigation could benefit areas impacted by Hurricane Harvey and Tropical Storm Imelda (see Attachment D), as well as other recent and historical events. Preliminary evaluation of downstream hydraulic benefits will be performed as part of the ongoing conceptual design phase.

- F) The San Jacinto River Authority (SJRA) Flood Management Division is focused on creating and sustaining regional flood management partnerships and coordinating with stakeholders to provide regional flood mitigation solutions within the San Jacinto River Basin. Created in 2018 in response to Governor Abbott calling on SJRA to become more involved with regional flood management, the Division has acted cooperatively with various political subdivisions throughout the region to address flood control/mitigation needs within the jurisdictional area of SJRA, and is now leading efforts with other entities to submit multiple abridged FIF funding applications for projects which span the Upper San Jacinto River Basin (Lake Houston watershed). For this specific application, SJRA coordinated with HCFCD and Montgomery County. HCFCD is a technical partner on the ongoing conceptual design phase for the project, and is anticipated to continue in that capacity for the remainder of the overall project.
- G) Despite the fact that this project is for preliminary design of a particular project, it is being submitted as a Category 1 project due to its intended role as a pilot project which may inform larger, Upper San Jacinto River Basin-wide efforts, potentially in conjunction with the Upper San Jacinto River Basin Regional Sedimentation Study project, for which SJRA is submitting a separate FIF abridged application. If results of this pilot project indicate that sand traps are a feasible and effective solution to mitigate sedimentation issues in the Upper San Jacinto River Basin (Lake Houston watershed), a larger program of sand trap design and construction in various locations throughout the basin could potentially be implemented. As stated above in the project description, the pilot project will allow for determination of feasibility and effectiveness of this strategy before commitments are made to much larger and more costly efforts.
- H) As the project is currently only in the conceptual design phase with the goal of identifying feasible sand trap locations, a benefit/cost ratio has not yet been determined. Preliminary cost estimates for conceptual sand trap solutions will be developed as part of the ongoing conceptual design phase, and more detailed costs will be developed in the preliminary design phase covered in this application, as well as in future phases.
- I) As described in the project description above, SJRA is coordinating with APOs in the region in an attempt to establish a public/private partnership or partnerships which would provide for the performance of operation and maintenance of the proposed sand trap(s) by an APO or APOs.

INFORMATION FOR GRANT FUNDING

Provide information for the applicable level of grant funding:

Category 1:

Study area AMHI (weighted average based on population)-\$101,863.55

(Optional – attached a copy of federal disaster declaration – flood related within the last 60 months) **See Attachment D**

~~Categories 2, 3, and 4 **N/A**~~

- ~~➤ For consideration of being outside MSA: Project is entirely located outside of an MSA - Yes ☐ or No ☒~~
- ~~➤ Project area AMHI (weighted average based on population)-\$ _____~~
- ~~➤ Project area Unemployment Rate (weighted average based on population)- _____%~~
- ~~➤ Project area Population Decline (if any) (based on sum of the population in the project areas)- _____%~~
- ~~➤ For consideration of being an Rural Applicant: All entities within the project benefit area are outside MSAs and have populations <10,000; or the applicant is a district or municipality with a service area of 10,000 or less in population; or located in a county in which no urban area exceeds 50,000 in population - Yes ☐ or No ☒~~
- ~~➤ For consideration of being a Green or Nature-Based project: Percentage of total project costs that are considered green or nature-based- _____% (attach the calculation)~~

Note: If requesting grant funds that rely on a calculation of the AMHI, Unemployment Rate, or Population Decline then attach the calculation of the weighted average amounts for the project area based on the applicable U.S. Census Bureau geographic areas such as County, Place (City), Census Tract, or Block Group using the ACS data sources described in the IUP. **See Attachment B for US Census Bureau data calculations. See item (B) in Description of Proposed Project for explanation of project benefit area.**

During census data compilation efforts for abridged grant applications, it was noted by SJRA staff that the number of block groups included in each project benefit area did not always necessarily correlate to the same number of rows of census data in the census data spreadsheet provided by TWDB when queries were run to extract only the spreadsheet data related to the block groups for specific project benefit areas. This is not necessarily the case on all projects/grant applications submitted by SJRA, but SJRA wanted to make TWDB aware of this inconsistency.

PRIORITIZATION CRITERIA

<p>Rural Applicant</p> <p>All entities within the project benefit area are (a) outside MSAs and have populations <10,000; or (b) a district or municipality with a service area of 10,000 or less in population; or (c) a county in which no urban area exceeds 50,000 in population.</p>	<div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No </div> <p><i>(Please attach a list of all entities in the project benefit area and U.S. Census Bureau 2014-2018 American Community Survey (ACS) 5-year estimates data indicating the population of each area.)</i></p>
<p>Emergency Need Due to Recent or Imminent Failure or recent Flood-related Disaster Declarations.</p> <p>A need exists for flood hazard mitigation actions to address a clear and imminent threat to public health, safety, and welfare or property due to recent or imminent failure of existing flood infrastructure or flood-related federal or state disaster declarations within the most recent 36 months that would be significantly mitigated by the proposed project.</p>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <input type="checkbox"/> Yes, due to a recent failure. </div> <div style="text-align: center;"> <input type="checkbox"/> Yes, due to imminent failure. </div> <div style="text-align: center;"> <input checked="" type="checkbox"/> Yes, recent flood-related disaster declaration for the proposed project area Hurricane Harvey (FEMA-4332-DR) and Tropical Storm Imelda (FEMA-4466-DR). See Attachment D and item (E) in <u>Description of Proposed Project.</u> </div> <div style="text-align: center;"> <input type="checkbox"/> No </div> </div>
<p>Distributed Benefits</p> <p>Is the project expected to directly benefit or include the active participation of jurisdictions other than the applicant?</p>	<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No </div> <p style="color: red;">Potential benefits to multiple entities within the basin. Requested input from multiple entities as part of application development process, and SJRA anticipates partnering, at a minimum, with HCFCD on project execution. See items (B) and (F) in <u>Description of Proposed Project and Attachment A.</u></p>

<p>Estimated Completion Date</p> <p>When would all project phases expected to be complete, assuming funds for the project are closed on in Fall of the current year?</p>	<div> <input checked="" type="checkbox"/> Within 18 months of closing <input type="checkbox"/> Within 36 months of closing <input type="checkbox"/> Other </div> <p>See item (C) in Description of Proposed Project for more information.</p>
<p>Construction Projects Only (Including PAD plus Construction combined)</p> <p>Project is anticipated to result in an integral, reliable, and quantifiable water supply benefit to a specific water user group with an identified need. May include groundwater recharge benefits.</p>	<div> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No </div> <p>While this application is for preliminary engineering design only, the ultimate goal of the project is to perform construction. One of the benefits of sand trap construction will be reduced sediment load entering Lake Houston, which would in turn reduce water supply storage reduction in the lake. See item (D) in Description of Proposed Project for explanation.</p>
<p>Construction Projects Only (Including PAD plus Construction combined)</p> <p>How many structures are anticipated to be removed from floodplains as a result of the proposed project?</p>	<p>The level of flood mitigation potentially provided by constructing the proposed sand trap(s) is not quantified at this time. However, the goal of constructing the sand trap(s) is to restore, maintain, or expand storm flow capacity, which could potentially remove structures from the floodplain. See item (E) in Description of Proposed Project.</p>
<p>Non-structural flood mitigation elements</p> <p>Non-structural flood mitigation elements constitute at least 20 percent of the total project costs.</p>	<p>Percentage of total project costs that are considered nature-based- 0%</p>

Tiebreaker: Social Vulnerability Index (SVI)	Average SVI of benefitting area: 0.2078 Geographic basis: <input checked="" type="checkbox"/> Census Tracts <input type="checkbox"/> Counties <i>Please attach a list of the selected geographies and an explanation of why they were selected. See item (B) in <u>Description of Proposed Project</u> for explanation of project benefit area. See Attachment A for project benefit area map. See Attachment B for SVI calculations. 2018 CDC statewide ranking SVI data was utilized, as opposed to 2016 nationwide ranking data found in the CDC SVI map referenced in the IUP. This was confirmed as appropriate by TWDB via email.</i>
Certification on MOUs (if MOUs will be required) If no MOUs will be required, check here: <input checked="" type="checkbox"/> N/A for Category 1 projects per Intended Use Plan.	I, _____ (Name), serving as _____ (Title) hereby certify that _____ (Applicant) has provided all eligible political subdivisions that will be required to submit a Memorandum of Understanding a copy of their proposed Memorandum of Understanding and an adequately detailed description of the proposed project. <div style="display: flex; justify-content: space-between;"> <div>_____ Signature</div> <div>_____ Date</div> </div>

ADDITIONAL INFORMATION FOR THE FLOOD INFORMATION CLEARINGHOUSE COMMITTEE

Responses to questions 1 through 7, along with other information included in this abridged application, will be shared with the Flood Information Clearinghouse Committee (FLICC), a new cooperative effort between the TWDB, General Land Office, Texas Division of Emergency Management, and other state and federal agencies that administer flood mitigation financial assistance programs. After review by the FLICC, the applicant may be advised of other available source(s) of funding.

1. Type of Assistance Requested (Check all that apply):	<input type="checkbox"/> Low Interest Loan <input checked="" type="checkbox"/> Grant <input type="checkbox"/> Loan/Grant Combination <input type="checkbox"/> Local Match for Federal Funding
If requesting funds for the local cost share of a federally funded project, the name of the program:	N/A
2. County(ies) in which the project is located:	Likely Montgomery and/or Harris Counties. Preliminary See item (B) in Description of Proposed Project for explanation.
3. (If applicable) Associated FEMA disaster name and number:	Hurricane Harvey (FEMA-4332-DR) and Tropical Storm Imelda (FEMA-4466-DR), see Attachment D
4. Does the applicant have an approved Mitigation Action Plan?	No
5. Is the community to be served by the project in good standing with the National Flood Insurance Program?	Yes, see Attachment E.
6. Will this project involve enlargement of a dam or levee beyond the original footprint of the structure that existed prior to a disaster event?	No
7. Will this project mitigate a repetitive or severe repetitive loss property?	See Attachment D and item (E) in Description of Proposed Project .

CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

<p>Certification on enforcing floodplain management standards</p> <p>Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: <input type="checkbox"/></p>	<p>I, _____(Name), serving as _____(Title) hereby certify that _____(Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.</p> <p>_____ Signature _____ Date</p>
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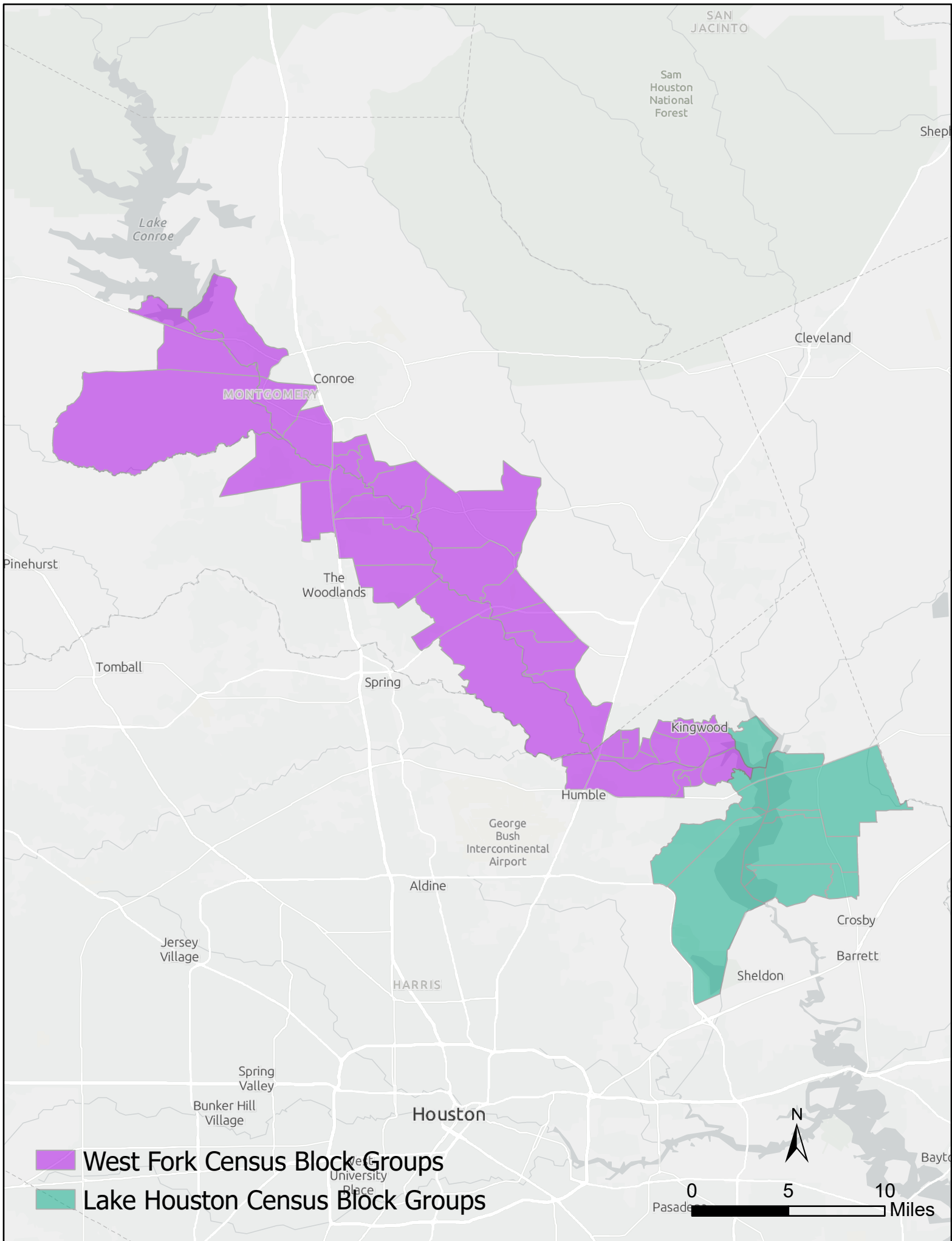
SEE ATTACHMENT E

ATTACHMENT CHECKLIST

✓	N/A	Attachment Description
<input type="checkbox"/>	<input checked="" type="checkbox"/>	List of entities receiving the proposed MOU and project description N/A for Category 1 projects per Intended Use Plan.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Benefit-Cost Ratio required information. See item (H) in project description for explanation.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Documentation indicating the best/most recent data was used in the development of the proposed project. See item (A) in <u>Description of Proposed Project</u>.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Documentation demonstrating the area to be served by the proposed project has floodplain ordinances in place and the appropriate entity has certified that it is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards. (The only exception is an entity that is requesting FIF funding to fulfill the requirements for participation in the National Flood Insurance Program.) See Attachment E.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	If requesting grant funds that rely on a calculation of the AMHI, Unemployment Rate, or Population Decline then attach the calculation of the weighted average amounts for the project area based on the applicable U.S. Census Bureau geographic areas such as County, Place (City), Census Tract, or Block Group and the ACS data sources described in the IUP. See Attachments A and B.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	If requesting prioritization points for "Rural Applicant", a list of all entities in the project benefit area and U.S. Census Bureau 2014-2018 American Community Survey (ACS) 5-year estimates data indicating the population of each area.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(If applying for matching funds) Documentation of an existing federal award pending availability of local match.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(If the project involves property acquisitions) Documentation supporting the determination that acquisitions are the best solution and the properties are a high risk. Some property or easement acquisition likely required for the project, but not for the purposes of "buyouts" or removing at-risk properties from the floodplain, and not during this project phase.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(Construction projects) Description of the anticipated funding source for operations and maintenance costs. Only applying for preliminary design at this time, but see item (I) in <u>Description of Proposed Project</u>.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(Construction projects) Map and description of area benefitting from the proposed project, including a list of all benefitting political subdivisions. Only applying for preliminary design at this time.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	(If applicable) Documentation of recent or imminent infrastructure failure causing an emergency need or a flood-related federal or state disaster declaration within the most recent 36 months that would be significantly mitigated by the proposed project. Hurricane Harvey (FEMA-4332-DR) and Tropical Storm Imelda (FEMA-4466-DR), see Attachment D and item (E) in <u>Description of Proposed Project</u>.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	List and explanation of geographies used to determine average SVI. See SVI section of <u>Prioritization Criteria</u>, item (B) in <u>Description of Proposed Project</u>, and Attachments A and B.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Certification on enforcing floodplain management standards for all applicable areas See Attachment E.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Additional Information for the Flood Information Clearinghouse Committee

Attachment A:

Project Benefit Area



Attachment B:

Census/SVI Data and Calculations

Overall SVI	Location	Geography	County	2018 ACS 5 YR - Annual Median Household Income (B19013_001E)	2018 ACS 5 YR - Average Household Size (B25010_001E)	2014 ACS 5 YR - Total Population (B01003_001E) - Prior	2018 ACS 5 YR - Total Population (B01003_001E) - Current	2018 Unemployment Rate (derived from Civilian Labor Force-Unemployed/Total-B23025)	2018 ACS 5 YR - Civilian Labor Force: Total (B23025_003E)	2018 ACS 5 YR - Civilian Labor Force: Unemployed (B23025_005E)	AMHI x 2018 Population	Unemployment x 2018 Population	SVI x 2018 Population
0.0833	West Fork	Block Group 2, Census Tract 6945, Montgomery County, Texas	Montgomery	126989	3.06	5265	10193	3.53	5157	182	1294398877	35981	849
0.1189	West Fork	Block Group 5, Census Tract 6920.01, Montgomery County, Texas	Montgomery	116457	3.2	5687	7656	3.1	3873	120	891594792	23734	910
0.1189	West Fork	Block Group 2, Census Tract 6920.01, Montgomery County, Texas	Montgomery	94890	3.07	9034	10045	6.61	5177	342	953170050	66397	1194
0.1344	West Fork	Block Group 2, Census Tract 6905, Montgomery County, Texas	Montgomery	129612	3.16	3340	5787	3.52	2984	105	750064644	20370	778
0.64	West Fork	Block Group 4, Census Tract 6922, Montgomery County, Texas	Montgomery	52299	2.52	772	1248	0	438	0	65269152	0	799
0.0553	West Fork	Block Group 1, Census Tract 6943.02, Montgomery County, Texas	Montgomery	72165	2.24	1516	1877	1.98	908	18	135453705	3716	104
0.2041	West Fork	Block Group 1, Census Tract 2507.01, Harris County, Texas	Harris	94318	3.49	1662	1935	4.56	965	44	182505330	8824	395
0.3105	West Fork	Block Group 1, Census Tract 2510, Harris County, Texas	Harris	65966	2.53	2302	1877	8.64	995	86	123818182	16217	583
0.4497	West Fork	Block Group 1, Census Tract 2409.02, Harris County, Texas	Harris	26566	2.31	998	875	0	414	0	23245250	0	393
0.3034	West Fork	Block Group 3, Census Tract 6921, Montgomery County, Texas	Montgomery	101471	2.76	2283	2229	3.06	1405	43	226178859	6821	676
0.5311	West Fork	Block Group 3, Census Tract 6944, Montgomery County, Texas	Montgomery	57321	2.62	2027	2332	2.66	1203	32	133672572	6203	1239
0.3034	West Fork	Block Group 2, Census Tract 6921, Montgomery County, Texas	Montgomery	87514	3.02	7103	8014	3.9	4517	176	701337196	31255	2431
0.3034	West Fork	Block Group 1, Census Tract 6921, Montgomery County, Texas	Montgomery	79896	2.84	2985	4766	6.03	2489	150	380784336	28739	1446
0.64	West Fork	Block Group 2, Census Tract 6922, Montgomery County, Texas	Montgomery	54407	3.23	757	1026	7.87	432	34	55821582	8075	657
0.3654	West Fork	Block Group 1, Census Tract 6923, Montgomery County, Texas	Montgomery	66811	4.18	4162	4480	0	1657	0	299313280	0	1637
0.3654	West Fork	Block Group 4, Census Tract 6923, Montgomery County, Texas	Montgomery	55322	1.69	2890	2299	3.9	1129	44	127185278	8966	840
0.2089	West Fork	Block Group 2, Census Tract 6932, Montgomery County, Texas	Montgomery	93389	2.51	2136	1975	2.32	1076	25	184443275	4582	413
0.2089	West Fork	Block Group 3, Census Tract 6932, Montgomery County, Texas	Montgomery	66250	2.2	1457	981	5.19	443	23	64991250	5091	205
0.2089	West Fork	Block Group 4, Census Tract 6932, Montgomery County, Texas	Montgomery	122460	3.3	2056	1601	5.62	854	48	196058460	8998	334
0.3642	West Fork	Block Group 2, Census Tract 6933, Montgomery County, Texas	Montgomery	83365	3.07	2828	3519	5.3	1775	94	293361435	18651	1282
0.3642	West Fork	Block Group 3, Census Tract 6933, Montgomery County, Texas	Montgomery	62500	2.11	2731	3183	3.55	1889	67	198937500	11300	1159
0.0538	West Fork	Block Group 1, Census Tract 6920.02, Montgomery County, Texas	Montgomery	191486	3.37	2294	5885	0.98	3057	30	1126895110	5767	317
0.2419	West Fork	Block Group 2, Census Tract 6937, Montgomery County, Texas	Montgomery	96298	2.6	4797	5840	2.76	3041	84	562380320	16118	1413
0.2041	West Fork	Block Group 2, Census Tract 2507.01, Harris County, Texas	Harris	59444	1.92	1276	622	7.74	336	26	36974168	4814	127
0.0772	West Fork	Block Group 3, Census Tract 2508, Harris County, Texas	Harris	134007	3.05	4011	4453	2.51	2229	56	596733171	11177	344
0.2041	West Fork	Block Group 3, Census Tract 2507.01, Harris County, Texas	Harris	76440	3.23	3302	3090	7.76	1662	129	236199600	23978	631
0.3105	West Fork	Block Group 2, Census Tract 2510, Harris County, Texas	Harris	142350	2.7	661	1217	5.61	517	29	173239950	6827	378
0.2373	West Fork	Block Group 2, Census Tract 2511, Harris County, Texas	Harris	81477	2.37	1285	1116	5.71	700	40	90928332	6372	265
0.2373	West Fork	Block Group 3, Census Tract 2511, Harris County, Texas	Harris	111172	2.48	2118	1584	4.44	879	39	176096448	7033	376
0.64	West Fork	Block Group 3, Census Tract 6922, Montgomery County, Texas	Montgomery	59222	3.1	5957	4487	5.81	1962	114	265729114	26069	2872
0.2373	West Fork	Block Group 5, Census Tract 2511, Harris County, Texas	Harris	57014	2.9	1766	2745	11.6	1250	145	156503430	31842	651
0.0889	West Fork	Block Group 4, Census Tract 2513, Harris County, Texas	Harris	93008	2.65	1912	1687	4.28	724	31	156904496	7220	150
0.0889	West Fork	Block Group 5, Census Tract 2513, Harris County, Texas	Harris	57891	2.13	1190	745	0	289	0	43128795	0	66
0.2062	West Fork	Block Group 2, Census Tract 6907, Montgomery County, Texas	Montgomery	77625	2.02	6214	6646	2.63	3196	84	515895750	17479	1370
0.1254	West Fork	Block Group 2, Census Tract 2509, Harris County, Texas	Harris	81964	2.12	3238	3243	7.11	1632	116	265809252	23058	407
0.2373	West Fork	Block Group 4, Census Tract 2511, Harris County, Texas	Harris	86528	2.49	568	458	13.98	279	39	39629824	6403	109
0.0353	West Fork	Block Group 6, Census Tract 2515.02, Harris County, Texas	Harris	126458	2.39	1570	1015	5.55	559	31	128354870	5633	36
0.1521	Lake Houston	Block Group 3, Census Tract 2519.01, Harris County, Texas	Harris	86066	2.5	2179	2253	2.49	1045	26	193906698	5610	343
0.1521	Lake Houston	Block Group 2, Census Tract 2519.01, Harris County, Texas	Harris	102969	2.95	589	784	0	384	0	80727696	0	119
0.3715	Lake Houston	Block Group 4, Census Tract 2517, Harris County, Texas	Harris	44087	2.81	2281	2452	0	908	0	108101324	0	911
0.3715	Lake Houston	Block Group 2, Census Tract 2517, Harris County, Texas	Harris	56754	2.73	3528	2497	1.47	1160	17	141714738	3671	928
0.1123	Lake Houston	Block Group 3, Census Tract 2504.02, Harris County, Texas	Harris	66944	2.58	5165	5100	0.87	2188	19	341414400	4437	573
0.1521	Lake Houston	Block Group 1, Census Tract 2519.01, Harris County, Texas	Harris	88906	2.98	3923	3404	6.44	1739	112	302636024	21922	518
0.2133	Lake Houston	Block Group 1, Census Tract 2520, Harris County, Texas	Harris	127921	3.16	13818	19799	4.41	10952	483	2532707879	87314	4223
0.1521	Lake Houston	Block Group 4, Census Tract 2519.01, Harris County, Texas	Harris	60215	2.77	3105	3818	9.98	1883	188	229900870	38104	581
0.0772	Lake Houston	Block Group 2, Census Tract 2508, Harris County, Texas	Harris	81813	2.54	2583	2417	2.61	1035	27	197742021	6308	187
0.1123	Lake Houston	Block Group 1, Census Tract 2504.02, Harris County, Texas	Harris	123659	3.24	10305	15970	3.15	8393	264	1974834230	50306	1793
0.1254	Lake Houston	Block Group 4, Census Tract 2509, Harris County, Texas	Harris	221042	3.66	4331	4225	0	1553	0	933902450	0	530
Population Totals:						157,957	185,450						
								Total AMHI x 2018 Population (A) =		18,890,595,965			
								Total 2018 Population (B) =		185,450			
								Total Weighted Average AMHI (A/B) = \$		101,863.55			
								Total Unemployment x 2018 Population (C) =		731,382.59			
								Total 2018 Population (D) =		185,450			
								Total Weighted Average Unemployment (C/D) =		3.94			
								SVI x 2018 Population (E) =		38,538.81			
								Total 2018 Population (F) =		185,450			
								Total Weighted Average SVI (E/F) =		0.2078			

Attachment C:

Grant Percentage Calculator Spreadsheet

CATEGORY 1 - San Jacinto River Sand Trap Development Preliminary Design

Project AMHI =	\$ 101,863.55	
State AMHI =	\$ 59,570.00	
Project/State =	171%	
Project/State \leq 50% and Fed. Disaster Declaration Last 5 Years =	100% Grant	<input type="checkbox"/>
Project/State \leq 75% =	90% Grant	<input type="checkbox"/>
Project/State $>$ 75% and \leq 125% =	75% Grant	<input type="checkbox"/>
Project/State $>$ 125% =	50% Grant	<input checked="" type="checkbox"/>
AMHI Grant % =	50%	

TOTAL GRANT % =	50%
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Notes:

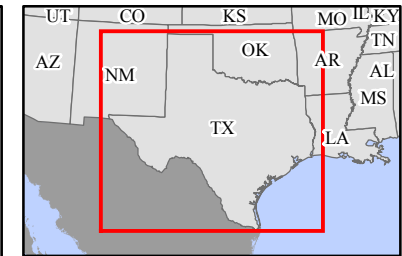
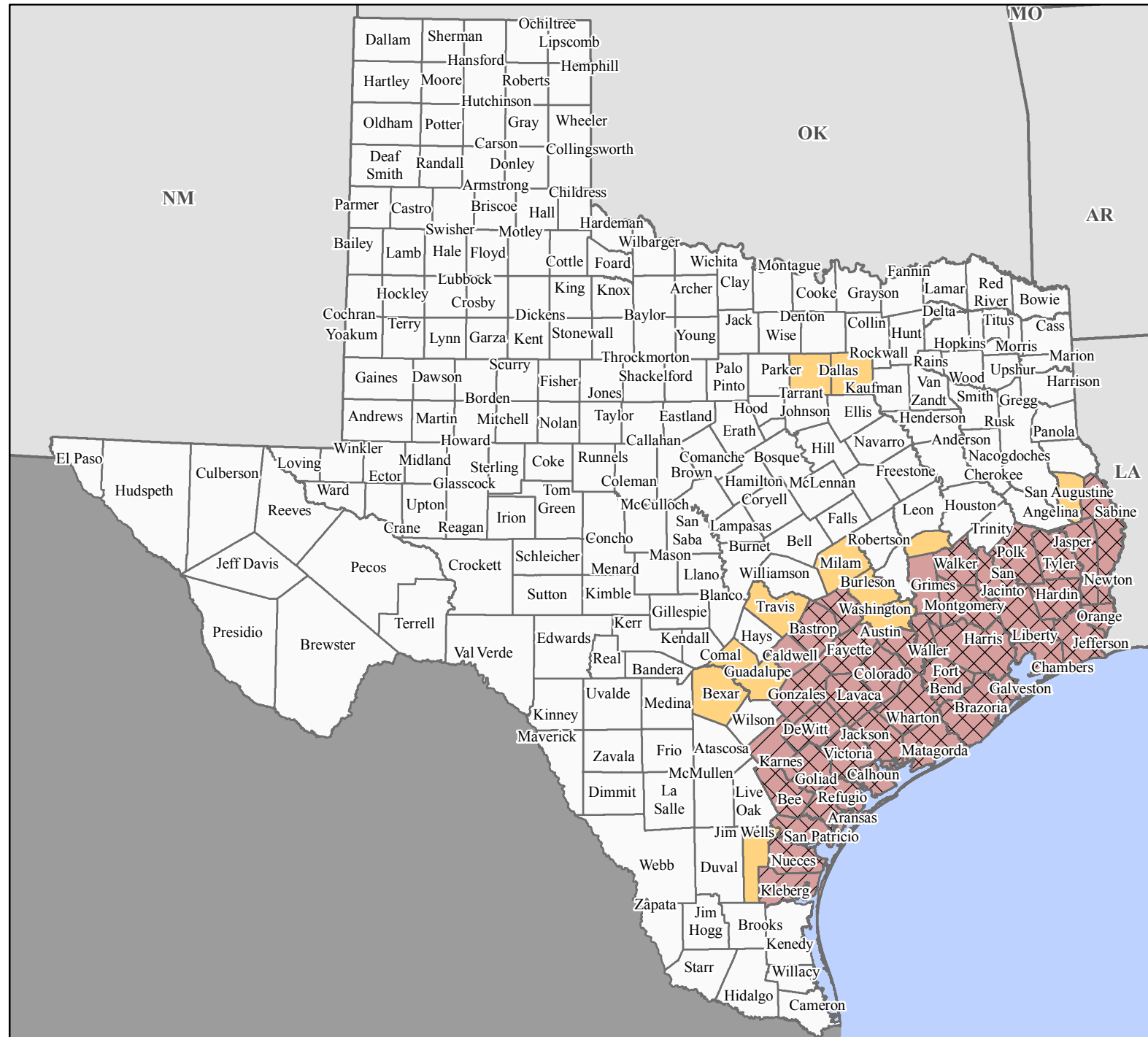
Attachment D:

Disaster Declarations for Hurricane Harvey
and Tropical Storm Imelda

FEMA-4332-DR, Texas Disaster Declaration as of 10/11/2017



FEMA

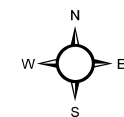


Data Layer/Map Description:
The types of assistance that have been designated for selected areas in the State of Texas.

All designated areas in the State of Texas are eligible to apply for assistance under the Hazard Mitigation Grant Program.

Designated Counties

- No Designation
- Public Assistance
- Individual Assistance and Public Assistance
- Public Assistance (Category B)
- Individual Assistance and Public Assistance (Categories A and B)
- Individual Assistance and Public Assistance (Categories A - G)



0 40 80 120 160
Miles

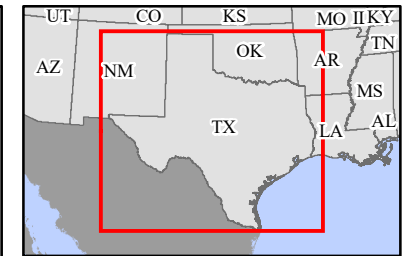
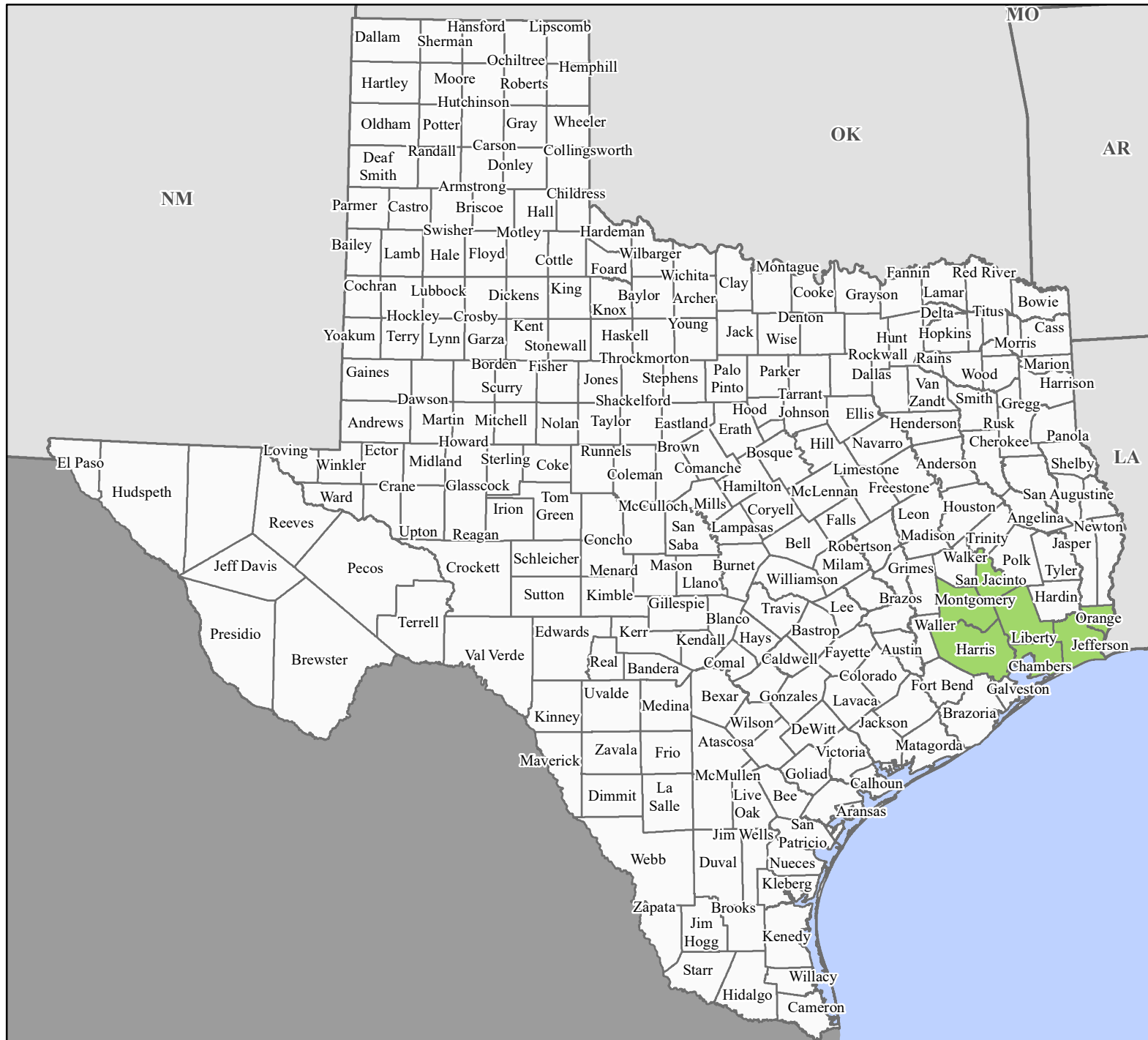
Data Sources:

FEMA, ESRI;
Initial Declaration: 08/25/2017
Disaster Federal Registry Notice:
Amendment #10 - 10/11/2017
Datum: North American 1983
Projection: Lambert Conformal Conic

FEMA-4466-DR, Texas Disaster Declaration as of 10/24/2019



FEMA



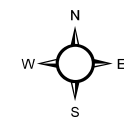
Data Layer/Map Description:

The types of assistance that have been designated for selected areas in the State of Texas.

All areas within the State of Texas are eligible for assistance under the Hazard Mitigation Grant Program.

Designated Counties

- No Designation
- Individual Assistance



0 40 80 120 160
Miles

Data Sources:

FEMA, ESRI;
Initial Declaration: 10/04/2019
Disaster Federal Registry Notice:
Amendment #1: 10/24/2019
Datum: North American 1983
Projection: Lambert Conformal Conic

Attachment E:

NFIP Certifications


CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

Certification on enforcing floodplain management standards	I, <u>DAVID DOUGLAS</u> (Name), serving as <u>Floodplain Mgr.</u> (Title)
Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: <input type="checkbox"/>	hereby certify that <u>Liberty County</u> (Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.
	<u>David Douglas</u> Signature <u>4/29/20</u> Date

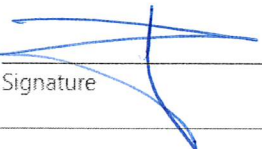
CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

<p>Certification on enforcing floodplain management standards</p> <p>Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: <input type="checkbox"/></p>	<p>I, <u>David Brandon</u> (Name), serving as <u>Floodplain Administrator</u> (Title)</p> <p>hereby certify that <u>San Jacinto County</u> (Appropriate entity for area to be served by the project)</p> <p>is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.</p> <p> Signature</p> <p><u>5/8/2020</u> Date</p>
---	--

CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

<p>Certification on enforcing floodplain management standards</p> <p>Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: <input type="checkbox"/></p>	<p>I, <u>Jonathan Steiber</u> (Name), serving as <u>Harris County Floodplain Administrator</u> (Title)</p> <p>hereby certify that <u>San Jacinto River Authority Harris County</u> (Appropriate entity for area to be served by the project)</p> <p>is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.</p> <p> Signature</p> <p><u>4-29-2020</u> Date</p>
--	---


CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

<p>Certification on enforcing floodplain management standards</p> <p>Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: <input type="checkbox"/></p>	<p>I, <u>Jay Muschenheim</u> (Name), serving as <u>Flood Plain Administrator</u> (Title)</p> <p>hereby certify that <u>unincorporated Montgomery Co., TX</u> (Appropriate entity for area to be served by the project)</p> <p>is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.</p> <p> _____ Signature</p> <p>_____ Date <u>April 29, 2020</u></p>
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CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

<p>Certification on enforcing floodplain management standards</p> <p>Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: <input type="checkbox"/></p>	<p>I, <u>Choyce Morrow</u> (Name), serving as <u>Flood Administrator</u> (Title)</p> <p>hereby certify that <u>City of Houston</u> (Appropriate entity for area to be served by the project)</p> <p>is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.</p> <p><u>Choyce Morrow</u> <u>6/2/2020</u> Signature Date</p>
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CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

<p>Certification on enforcing floodplain management standards</p> <p>Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: <input type="checkbox"/></p>	<p>I, <u>Ann Colina</u> (Name), serving as <u>Floodplain Administrator</u> (Title) hereby certify that <u>the City of Caroe</u> (Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.</p> <p><u></u> Signature <u>5-15-20</u> Date</p>
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Attachment F:

San Jacinto Regional Watershed Master
Drainage Plan Project Fact Sheet

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN FACT SHEET



The San Jacinto Regional Watershed Master Drainage Plan is a comprehensive regional study led by local partners including the Harris County Flood Control District, the San Jacinto River Authority, Montgomery County, and the City of Houston.

This integrated effort, kick started in April 2019, will identify future flood mitigation projects that can be implemented in the near- and long-term to reduce flood risks to people and property throughout the San Jacinto River regional **watershed**.

The goals of the San Jacinto Regional Watershed Master Drainage Plan are to:

- Identify the region's vulnerabilities to flood hazards using Atlas 14 rainfall
- Develop approaches to enhance public information and flood level assessment capabilities during a flood disaster event
- Evaluate flood mitigation strategies to improve community resilience
- Provide a comprehensive Flood Mitigation Plan that supports the needs and objectives of each regional partner

The goals of the project will be achieved by developing a set of hydrologic and hydraulic models for the major tributaries of the Upper San Jacinto River regional watershed (from the **headwaters** in Walker County to the Interstate 10 crossing at the San Jacinto River in Harris County). The models will use consistent, cohesive methodology and rainfall rates, regardless of the county in which those channels are located.

Information to be developed includes *non-regulatory* **inundation maps** (not intended to replace current effective maps) for the studied streams that show the extent and depth of **riverine flooding** of the larger rivers within the watershed for an array of simulated storm events. Additionally, information will be gathered about the number of structures, acres of land, properties, and miles of roadway that are located within the modeled floodplains. Study results will be used to inform and update **Hazard Mitigation Plans** for each of the participating partners and to provide guidance on regulations for future growth within the study area.

The project area covers nearly 3,000 square miles. The expected completion time frame is Fall 2020. The project is budgeted at \$2.7 million.

Contact Us

The participating project partners are interested in hearing from you. Please contact your local representative with comments and questions:

- **Harris County Flood Control District** – Jing Chen, jing.chen@hcfcd.hctx.net
- **San Jacinto River Authority** – Matt Barrett, mbarrett@sjra.net
- **Montgomery County** – Darren Hess, darren.hess@mctx.org
- **City of Houston** – Adam Eaton, adam.eaton@houston.tx.gov

GLOSSARY

Watershed: A geographical region of land or "drainage area" that drains to a common channel or outlet, mostly creeks and bayous. Drainage of the land can occur directly into a bayou or creek, or through a series of systems that may include storm sewers, roadside ditches, and/or tributary channels.

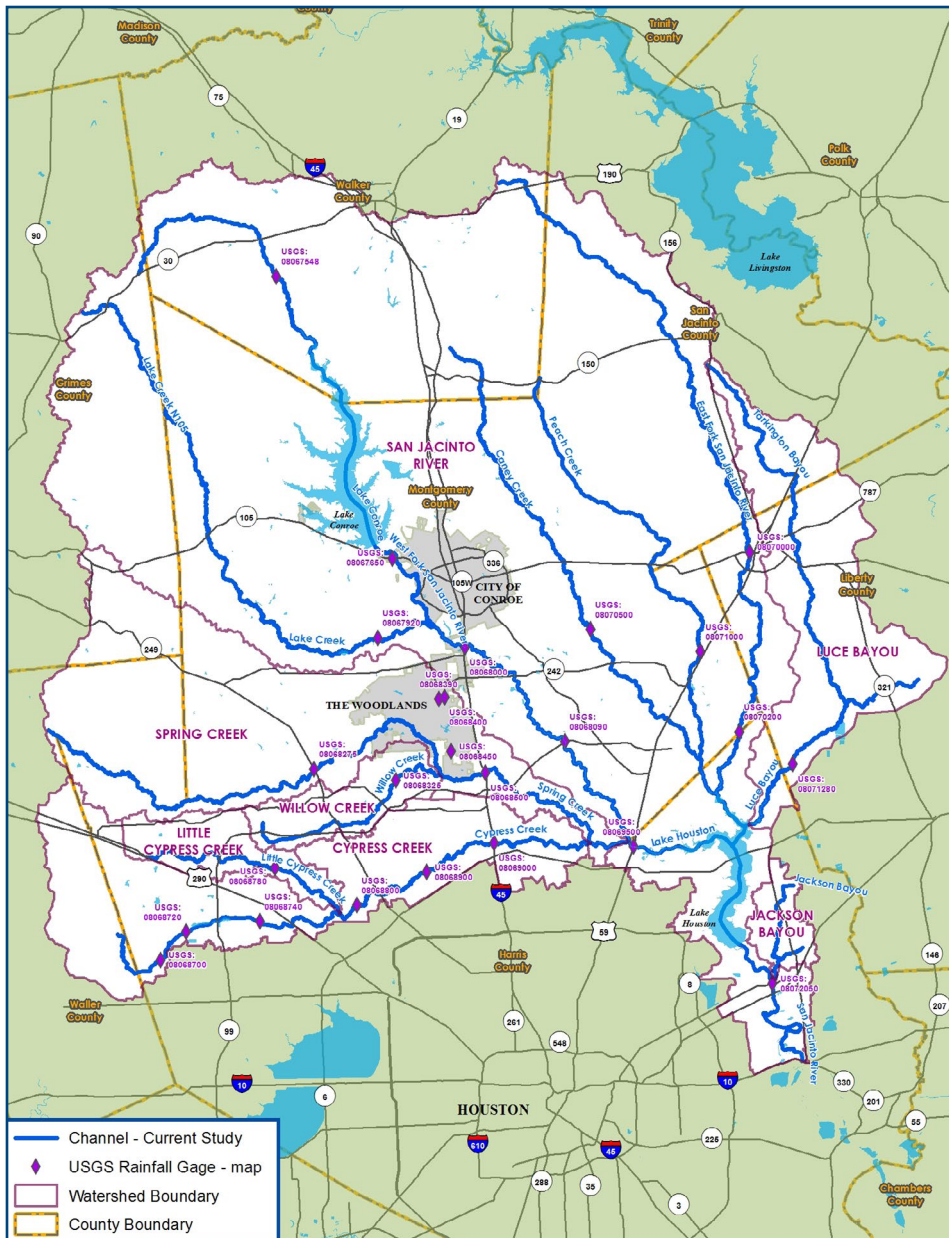
Headwaters: Headwaters are simply the initial source of the water in a river.

Inundation maps: Maps that show where flooding may occur over a range of water levels in a community's local stream or river.

Riverine flooding: Flooding that is the result of creeks and bayous leaving their banks due to heavy rainfall.

Hazard Mitigation Plans: Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters, such as flooding. Governmental organizations engage in hazard mitigation planning to identify risks and vulnerabilities associated with natural disasters, and develop long-term strategies for protecting people and property. Mitigation plans are key to breaking the cycle of disaster damage, reconstruction, and repeated damage.

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN STUDY AREA



3,000 SQUARE MILES OF STUDY AREA

The watershed for the streams to be studied covers an expanse of nearly 3,000 square miles, located in seven different counties:

- Grimes County
- Harris County
- Liberty County
- Montgomery County
- San Jacinto County
- Walker County
- Waller County

The study includes approximately 535 miles of stream, including West Fork San Jacinto River, East Fork San Jacinto River, San Jacinto River, Lake Creek, Cypress Creek, Little Cypress Creek, Spring Creek, Willow Creek, Caney Creek, Peach Creek, Luce Bayou, Tarkington Bayou, and Jackson Bayou.

Stream Name	Stream Length (Miles)
West Fork San Jacinto River	61.4
East Fork San Jacinto River	73.2
San Jacinto River	16.3
Lake Creek	58.9
Cypress Creek	60.5
Little Cypress Creek	20.8
Spring Creek	69.6
Willow Creek	19.8
Caney Creek	49.3
Peach Creek	53.5
Luce Bayou	10.8
Tarkington Bayou	36.9
Jackson Bayou	4.6
Total	535.6

Attachment G:

Conceptual Design Scope

San Jacinto River Authority
San Jacinto River and Tributaries Sediment Removal and Sand Trap Development
Work Order No. 1

This Work Order is issued subject to, is governed by and incorporates by reference that certain Professional Services Agreement, Contract No. 20-0024, between the SJRA and CONSULTANT effective March 26, 2020.

Work Order Date: March 26, 2020

CONSULTANT: Freese and Nichols, Inc.

Type of Compensation: Tasks 1101-1102 and 1104-1107 = Cost Plus Multiplier with Not-to-Exceed, Task 1103 = Lump Sum

Compensation: Tasks 1101-1102 and 1104-1107 (Cost Plus Multiplier with Not-to-Exceed) = \$185,179.52, Task 1103 (Lump Sum) = \$72,460.78, Total = \$257,640.30

Location of Services: San Jacinto River Basin (Montgomery, Harris, and potentially surrounding counties)

Description of Services: Provide professional engineering services for conceptual design of sediment trapping facilities along the West and East Forks of the San Jacinto River.

Deliverables: See Attached.

Schedule Requirements:

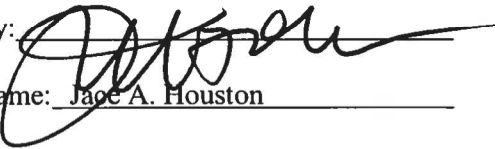
Commence Services: April 7, 2020

Completion of Services: September 21, 2020

Submittal Dates for Each Deliverable: See Attached.

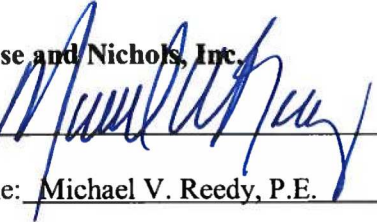
Agreed to by:

SJRA

By: 
Name: Jace A. Houston
Title: General Manager

and

Freese and Nichols, Inc.

By: 
Name: Michael V. Reedy, P.E.
Title: Vice President



**San Jacinto River Authority
San Jacinto River and Tributaries Sediment Removal and Sand Trap Development
Work Order No. 1**

SCOPE OF WORK

General

Sedimentation in the San Jacinto watershed's rivers and streams has been well documented over the last several decades. This effort will focus on sediment trapping facilities located in the West Fork San Jacinto mainstem and the East Fork San Jacinto mainstem to reduce sediment loads from flowing into Lake Houston. It will begin with an assessment of potential trapping facilities sites and then rank these sites using implementation strategies and efficacy.

This effort will conclude with three conceptual solutions for capturing sediment either on the West Fork and East Fork or exclusively on the West Fork. Freese and Nichols Inc.'s (FNI or Consultant) "Sedimentation Strategy for West Fork San Jacinto River and Spring Creek" report, developed as part of the San Jacinto Regional Watershed Master Drainage Plan project (Draft pending as of January 2020), will be leveraged in locating these sediment trapping facilities.

Location preference for these facilities will be in regions where sediment deposits naturally to take advantage of favorable hydraulic conditions for sediment trapping. Additional preferences will be: proximity to public roads, proximity to existing Aggregate Production Operation (APO) facilities and areas where environmental impacts will be minimal.

Each facility will be evaluated to understand its efficacy at trapping sediments and what are the anticipated benefits in reducing sediment accumulation in river channels downstream.

The Consultant shall provide:

**TASK 1101 – Project Management
FMPR0004.1001.2C001.30020**

1101.1 Project Management

1. Project Management: Provide for the management of the resources of the Consultant to meet the technical, financial, and schedule requirements of SJRA. This shall include the overall management of the project and the various specialized discipline teams responsible for the development of the project. Schedule and participate in meetings (in person or by phone, as appropriate) with SJRA, Consultant's sub-consultants, SJRA's third party consultants, and stakeholders (as appropriate). Harris County Flood Control District (HCFCD) will be invited to all project meetings, and project deliverables will be provided to HCFCD for the opportunity to review.

1101.2 Project Kickoff Meeting

1. A project kickoff meeting between the Consultant and SJRA personnel will be held at the beginning of the project to accomplish the following:
 - a. Review the Consultant's scope of work and discuss project expectations and goals.
 - b. Review the Consultant's proposed schedule and critical milestones.
2. This meeting is to be held at SJRA's Woodlands office, or other location as directed by SJRA, and is anticipated to last up to two (2) hours.

San Jacinto River Authority
San Jacinto River and Tributaries Sediment Removal and Sand Trap Development
Work Order No. 1

1101.3 Project Update Meetings

1. Project Update Meetings: Consultant shall participate in up to four (4) one-hour conference call meetings, in addition to other meetings described in this scope of work, with SJRA to present detailed status updates of the project's progress and budget and discuss any major issues identified.
2. Consultant understands that all physical (in person) meetings shall occur at SJRA's Woodlands Division office or as directed by SJRA. All meeting agendas, workshop planning information and handouts, meeting notes, and other applicable information pertaining to each specific meeting or workshop shall be developed and distributed by the Consultant.

1101.4 Quality Assurance and Quality Control

1. Consultant shall disseminate pertinent project information internally and externally, implement Quality Assurance (QA) and Quality Control (QC) measures, and submit deliverables as required per agreed-upon project schedule.

1101.5 Project Status Reports and Invoice

1. Project Schedule Development and Updates: Develop, manage, monitor, update, and coordinate (in coordination with SJRA staff) project schedule throughout the life of the project based on changes or necessary updates.
2. Project Status Reports: Provide written project status reports to SJRA once per month throughout the duration of the project. Project status reports shall include, at a minimum, a summary description of activities completed, description of activities planned for the next 30 days, financial status of the project, status of schedule for the project, and identification of any technical or other issues which may have an impact on the overall project budget and/or schedule. Project status reports shall be provided to SJRA with each invoice.
3. Invoicing: Consultant shall submit invoices monthly by the 10th day of the month following the month being invoiced for. Invoices shall include a record of Consultant's activities and deliverables completed within the month, and note activities planned for the next month. Invoices shall be submitted to ap@sjra.net. Coordinate with SJRA Project Manager to determine appropriate format and content for invoice submittals.
4. Consultant shall notify assigned SJRA Project Manager in writing that Consultant has expended eighty percent (80%) of the currently approved SJRA Professional Services Agreement and/or Work Order amount within seven (7) calendar days of Consultant reaching this expenditure milestone (80% expenditure milestone). Written notification shall be provided regardless of compensation type (i.e., lump sum, cost-plus multiplier, time-and-materials, etc.). Written notification shall include a statement by Consultant indicating whether remaining amount is adequate to complete current SJRA approved Professional Services Agreement and/or Work Order Scope of Work.

1101.6 Document Control

1. Document Control: SJRA shall utilize a SharePoint site to transmit data for this project. Consultant shall utilize this system as a management tool and repository of all data, reports,

San Jacinto River Authority
San Jacinto River and Tributaries Sediment Removal and Sand Trap Development
Work Order No. 1

photographs, letters, memoranda, design documents, models, and other information as directed by SJRA.

2. If requested by SJRA, Consultant shall participate in a QA Audit to be performed by SJRA at Consultant's office. Consultant shall cooperate with Auditor by providing access to project related electronic and hard copy files, and shall correct deficiencies noted in audit report provided by Auditor.

Deliverables: **Monthly Status Reports**

Monthly Status Reports shall be submitted electronically (.pdf) to SJRA via email to ap@sjra.net, with invoices, no later than the 10th day of every month to coincide with SJRA invoicing requirements throughout the duration of the Work Order.

Meeting Agendas, Handouts, and Minutes

Proposed agendas: Submit one (1) electronic copy (editable version) at least three (3) calendar days prior to meeting. Consultant will provide necessary number of hard copies at in-person meetings.

Meeting minutes: Submit draft meeting minutes (electronic editable version) within three (3) calendar days of meeting. Receive SJRA comments. Submit one electronic version (.pdf) via SharePoint of final meeting minutes within three (3) calendar days of receipt of comments on the draft meeting minutes.

Task 1102 – Map Preliminary Sediment Trapping Locations
FMPR0004.1001.2C001.30041

1102.1 West Fork

1. Obtain raster files used to map areas of aggradation and degradation from the “Sedimentation Strategy for West Fork San Jacinto River and Spring Creek” report, referred to as the 2020 Report. Raster files were created by subtracting older LiDAR data from more recent LiDAR data. In locations where the more recent LiDAR data is higher than the older LiDAR data, this is a location where sediment may have deposited. At locations where the more recent LiDAR is equal to or greater than two feet higher than the older LiDAR, confirm sediment deposition has occurred using aerial photos and calculate volume of sediment deposition. Rank aggradation sites by volume and locate whether the site was in either the sediment transitional region or the sediment deposition region (as mapped in the Sedimentation Strategy for West Fork San Jacinto River and Spring Creek report Report).
2. Obtain river centerline profiles from preliminary RAS models and effective RAS models from the San Jacinto Regional Watershed Master Drainage Plan project. Note the regions where

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river centerline profiles have flattened. Locate the regions using GIS and create a shapefile for each.

3. Obtain the digital elevation map from the 2020 Report and map locations where there is natural constriction in valley width. Note if this restriction is due to human activity (road crossings, etc.) or natural.
4. Cross reference valley wall restrictions with largest aggradation sites and areas where river centerline profile has flattened. Create shapefile of these locations. Each location is referred to as preliminary sediment trap location. Add all aggregate production operation (APO) sites to preliminary sediment trap location shapefile.

1102.2 East Fork (Note, Tasks 1102.2 (1) through (3) have been completed for the West Fork as part of the Sedimentation Strategy for West Fork San Jacinto River and Spring Creek report)

1. Define the stream network within the East Fork using ArcGIS's watershed analysis extension for both the 2018 LiDAR and the historic LiDAR. Historic LiDAR refers to LiDAR data measured in either 2008 or 2001. LiDAR measured in 2001 collected topographic data in Harris County, LiDAR measured in 2008 collected topographic data in Montgomery County.
2. Measure stream deflection between the 2018 LiDAR and historic LiDAR. Create maps depicting stream deviation.
3. Subtract historic LiDAR from the 2018 LiDAR. Map locations where 2018 LiDAR is higher which represents regions where sediment deposited, for example in sand bars. Map locations where the 2018 LiDAR is lower, for example at eroding stream banks. Calculate volumes for each condition where there is a 2 foot or greater difference between the LiDAR data sets.
4. Replicate tasks 1102.1 (1) through (4) using results from 1102.2 (1) through (3).

1102.3 Preliminary Site Characterizations

Note: Work Proposed For this Task and All Remaining Tasks are For Both the East Fork and West Fork

1. From the findings of 1102.1 and 1102.2, identify the ten areas with the largest volumes of sediment deposition, including at a minimum, the two largest volume areas on the East Fork and the two largest volumes at an APO or as directed by SJRA.
2. At each of the ten areas, measure the surface area at multiple vertical foot increments (2 feet, 4 feet, 8 feet, 12 feet). Measure surface areas of APO pits proximal to riverbanks.
3. Using readily available GIS data from the following sources, note pertinent environmental or jurisdictional considerations which are proximal to preliminary trapping facility locations.
 - FEMA Floodplain
 - National Wetland Inventory
 - Texas Historical Commission
 - Texas Parks and Wildlife

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- US Fish and Wildlife Service
4. For each preliminary facility location, map whether the proposed facility is on public property, private property or both. Note the number of landowners. Measure distance from nearest public road.
 5. Consult with appropriate stakeholders to understand existing recreational uses of the West Fork and East Fork. Map and measure distance to notable recreational facilities (parks, canoe/boat ramps, popular swimming locations, etc.). FNI anticipates to collaborate with SJRA on stakeholder group members. FNI assumes the stakeholder group to potentially include: Montgomery County Parks, Montgomery County Engineering, Harris County Engineering, Harris County Parks.
 6. Rank preliminary facilities using the following: sediment deposition volume, potential sediment storage volume, proximity to existing roads, proximity to existing APO facilities.
 7. Summarize findings and submit narrative with a list of preliminary sediment trapping facility rankings to SJRA. The narrative and rankings list will become part of the “Preliminary Sediment Trapping Locations” memo as described in task 1102.6. Obtain feedback on ranking of sites, and adjust ranking as needed.

1102.4 Preliminary Sediment Trapping Facility Ranking and Efficacy

1. Following SJRA’s guidance, select four preliminary sediment trapping facilities from the ranked list as described in 1102.3 (7).
2. For each facility, select two tributaries with the largest drainage area between the facility and the upstream extent of the study area. Upstream extents of the East Fork and West Fork will match the upstream end of each Fork’s respective upstream boundary from the San Jacinto Regional Watershed Master Drainage Plan project.
3. Repeat tasks 1102.2 (1) through (4) between the tributary’s confluence with the mainstem and three miles upstream on the tributary.
4. Summarize the volume of sediment entrained (as calculated in 1102.2 (3)) for the West Fork mainstem, East Fork mainstem and the tributaries selected in 1102.4 (2). Determine the number of years between when the 2018 LiDAR was collected and when the historic LiDAR was collected and divide this number into the summarized volume of sediment entrained upstream of each preliminary trapping facility,. The quotient is an approximation of the annual sediment load to each preliminary sediment trapping facility.
5. Calculate the number of years before each preliminary sediment trapping facility would be filled with sediments.
6. Map surficial geology, location of Deweyville terraces and highly erodible soils upstream of each site. Measure the length each mainstem and each tributary runs through these features and apply to appropriate facility locations.
7. FNI will submit the four selected sites and the narrative from task 1102.3(7) to the US Army Corps of Engineers to solicit if any additional information about the sites can be obtained, and

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to obtain preliminary information on permitting requirements if provided within the scheduled time frame. FNI will respond to technical questions.

1102.5 Windshield Survey

1. SJRA will coordinate with private landowners (if necessary) to gain access to the land where the four selected preliminary sediment trapping facilities are located, and to obtain preliminary information on willingness of landowner to consider providing land for sediment trapping facility. If land access cannot be obtained, or if a landowner expresses no willingness to provide land for future facility, for one of the four selected preliminary facilities, SJRA will select another preliminary sediment trapping facility site.
2. Complete a windshield survey of the four selected preliminary sediment trapping facilities access has been obtained for. Document construction opportunities and constraints (including potential environmental issues) and complete a sketch map of each site and note potential sediment trapping locations and methods. Describe expected level of difficulty of implementing a sediment trap at each location. If a facility is located at or near an APO, note opportunities and constraints to capture sediment in an existing pit or other location. Note water depth in pits proximal to river.

1102.6 Draft Preliminary Sediment Trapping Locations Memo

1. Submit a draft Preliminary Sediment Trapping Locations memo to SJRA summarizing the findings from tasks 1102.1 through 1102.5. This includes the narrative and preliminary ranking list from 1102.3. Use ranking criteria from 1102.3, maintenance frequency, flood water surface elevation impacts and expected level of difficulty implementing sediment trap, as well as information from the windshield survey results (1102.5), to rank the four sites.
2. Utilize a project update meeting to select three sites from the four sites identified in the Preliminary Sediment Trapping Locations memo.

1102.7 Final Preliminary Sediment Trapping Locations Memo

1. Organize comments received from SJRA and HCFCD on draft memo (1102.6). Incorporate comments and submit final version.

Deliverables:

Draft Preliminary Sediment Trapping Locations Memo

Submit draft memo to SJRA via SharePoint (editable version) within 58 calendar days of NTP.

Final Preliminary Sediment Trapping Locations Memo

Submit final memo to SJRA via SharePoint (PDF) within 72 calendar days of NTP.

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Task 1103 – Characterize Sediment Trapping Efficacy
FMPR0004.1001.2C001.30041

1103.1 Geotechnical Cores and Pebble Counts

1. Obtain geotechnical cores of deposited sediments (in sand bars, or gravel bars) upstream of each site. Obtain one core for each site (three cores total). Complete sediment fingerprinting by measuring levels of ²¹⁰Pb, ¹³⁷Cs or an equivalent radioactive isotope commonly found in atmospheric deposition in the watershed. These radioactive isotopes have an affinity in bonding with silt on top of the landscape.
2. Determine the percentage of sediment in the cores that is bound to this isotope. A high percentage of sediment with this isotope would suggest a high percentage of the sediment load occurs from the landscape (resulting from land use practices) and not alluvial erosion. This understanding will influence recommended sediment mitigation practices.
3. Complete particle size distribution of core samples using laser diffraction or sieve analysis for surface armor layer and subsurface layer. Determine fraction of sediments that are bedload, suspended load and wash load.
4. Complete a modified Wolman's pebble count of the surface armor layer at each sand bar or gravel bar a core is obtained from and a one pebble count of subsurface layer at each sand bar/gravel bar.

1103.2 Duplicate HEC-RAS Model

1. Obtain most up to date San Jacinto Regional WMDP preliminary RAS modeling results and replicate modeling results. Note locations where the three selected preliminary sediment trapping facilities are located. Determine if additional cross sections are needed in the region where preliminary sediment trapping facilities are located.

1103.3 Bankfull Hydrology

1. Locate the most proximal stream gage to each of the three sites. Extract average daily discharge gage data for the last several water years. A water year begins on October 1st and runs through September 30th. Calculate a partial duration curve and select the bankfull (channel forming) flow for each stream gage. Correct discharges using drainage area correction method. Compare results to regional regression curves that were developed by Harris County Flood Control District.
2. Extract the hydrograph of the smallest studied discharge from the preliminary model. A hydrograph representative of the hydrology upstream of each preliminary sediment trapping facility will be created. Truncate the preliminary model as needed to include the facility and the region proximally upstream and downstream. Use normal depth for downstream boundary conditions. Correct the hydrograph to fit the bankfull discharge for each site.

1103.4 Existing Condition HEC-RAS Model Runs

1. Amend the San Jacinto Regional WMDP preliminary model with the cross sections from 1103.2 as needed. Run the San Jacinto Regional WMDP preliminary model under existing

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conditions at the 100-year flood event, extract water surface profile and compare results to San Jacinto Regional WMDP preliminary findings.

2. Run the HEC-RAS model under existing conditions for each trapping site (three) and determine which particle size fraction will deposit using incipient motion calculations. Utilize particle size distribution measured in 1103.1.

1103.5 Proposed Condition HEC-RAS Model Runs

1. Amend the HEC-RAS geometry to include the proposed trapping facility (as described in task 1104.3) for each site. Run the model, one run for each site, under proposed conditions and compare sediment deposit results.
2. Compare proposed conditions model's water surface profile to corrected preliminary model's water surface elevation. Complete for the three sites.

1103.6 Draft Sediment Trapping Efficacy Memo

1. Submit Sediment Trapping Efficacy Memo to SJRA summarizing the findings from tasks 1103.1 through 1103.4. Rank the three sites. Use maintenance frequency, flood water surface elevation impacts, removal rate and expected level of difficulty implementing sediment trap, as well as any other applicable/appropriate criteria from previous tasks, in ranking. Evaluate each site individually and in aggregate.

1103.7 Meeting with SJRA and HCFCD

1. Meet with SJRA and HCFCD at the SJRA office to review memo and organize comments.

1103.8 Final Sediment Trapping Efficacy Memo

1. Incorporate comments and submit final version.

Deliverables: Draft Sediment Trapping Efficacy Memo

Submit draft memo to SJRA via SharePoint (editable version) within 87 calendar days of NTP.

Final Sediment Trapping Efficacy Memo

Submit final memo to SJRA via SharePoint (PDF) within 104 calendar days of NTP.

Task 1104 – Develop Conceptual Solutions
FMPR0004.1001.2C001.30041

1104.1 Typical Sediment Trapping Conceptual Solutions

1. Develop narrative and images of multiple typical sediment trap concepts. The narrative will include the materials used in each typical sediment trap concept, typical site description

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(topographic, hydraulic, proximity to infrastructure) and expected maintenance. Typical sediment trap concepts will be organized into two categories, “in-line traps” and “lateral traps”.

1104.2 Create Basemaps

1. For the three selected sites, apply one of the typical sediment trap concepts and develop a site-specific sediment trap.
2. Develop a baseline map for each site. Each baseline map will contain the following: 1' contours (from 2018 LiDAR), edge of water (from aerial photos), edge of vegetation, proximal roads and observable infrastructure and approximate tops and toes of stream banks. The baseline map will extend to the most proximal potential construction access road and maintenance access road.

1104.3 Develop Site Specific Trapping Facility Concepts

1. Create a conceptual solution for the three selected sites. Create exhibits for each site containing three sheets each: a plan view of the proposed construction access, a plan view of the proposed conceptual solution and an exhibit of the typical details.
2. Develop narrative and a table summarizing the proposed construction activities, expected maintenance frequency (using proposed conditions hydraulic modeling results from Task 1103.5) and activities, estimated quantities of work and an opinion of probable construction cost for each site.

Task 1105 – Downstream Sediment Reduction Benefits
FMPR0004.1001.2C001.30041

1105.1 Identify Sediment Prone Areas

1. Identify regions downstream of each preliminary sediment trapping facility where sediment deposition was mapped in the East Fork mainstem and West Fork mainstem. Cut three cross sections through a region downstream of each facility using the results from 1102.1 and 1102.2. Compare river conveyance area measured by the 2018 LiDAR to the river conveyance area measured by the historic LiDAR.

1105.2 Estimate Reduction of Sediment Accumulation in Each Cross Section

1. Determine the annual rate of sediment accumulation in each cross section. Estimate the reduction of sediment accumulation in each cross section using the anticipated annual storage volume to be achieved at each preliminary sediment trapping facility.

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**Task 1106 – Agency Coordination
FMPR0004.1001.2C001.30041**

1106.1 – Sediment Facility Fact Sheet and Agency Coordination

1. Organize the feedback from the USACE from coordination effort described in 1102.4(7) and develop a fact sheet for each of the proposed sediment trapping facilities to present the goal and function of the proposed sediment trapping facility to accompany each conceptual solution. If USACE feedback is not received in time for incorporation in this task, and if directed by SJRA, develop fact sheet excluding USACE feedback. The target audiences for the fact sheets are private entities, stakeholders and landowners.

**Task 1107 – Conceptual Design Report
FMPR0004.1001.2C001.30050**

1107.1 Draft Conceptual Design Report

1. Submit draft report to SJRA summarizing and compiling the findings and data from tasks 1104 through 1106, as well as 1103.5. Rank the three selected sites, including recommendation for sites to continue forward with into PER. Use updated maintenance frequency from hydraulic modeling results (1103.4 and 1103.5), updated flood water surface elevation impacts from hydraulic modeling results (1103.4 and 1103.5) and expected level of difficulty implementing sediment trap, as well as any other applicable/appropriate criteria from previous tasks, in ranking.
2. The report will summarize the anticipated environmental and jurisdictional permitting requirements.
3. Anticipated benefits in reductions of sediment accumulation in downstream areas will be presented.

1107.2 Meeting With SJRA and HCFCD

1. Meet with SJRA and HCFCD at the SJRA office to review memo, organize comments, and discuss recommendations for the Preliminary Engineering Report (Phase II).

1107.3 Final Conceptual Design Report

1. Incorporate comments and submit final version.

Deliverables:

Draft Conceptual Design Report

Submit draft report to SJRA via SharePoint (editable version) within 146 calendar days of NTP.

Final Conceptual Design Report

Submit final report to SJRA via SharePoint (PDF) within 161 calendar days of NTP.